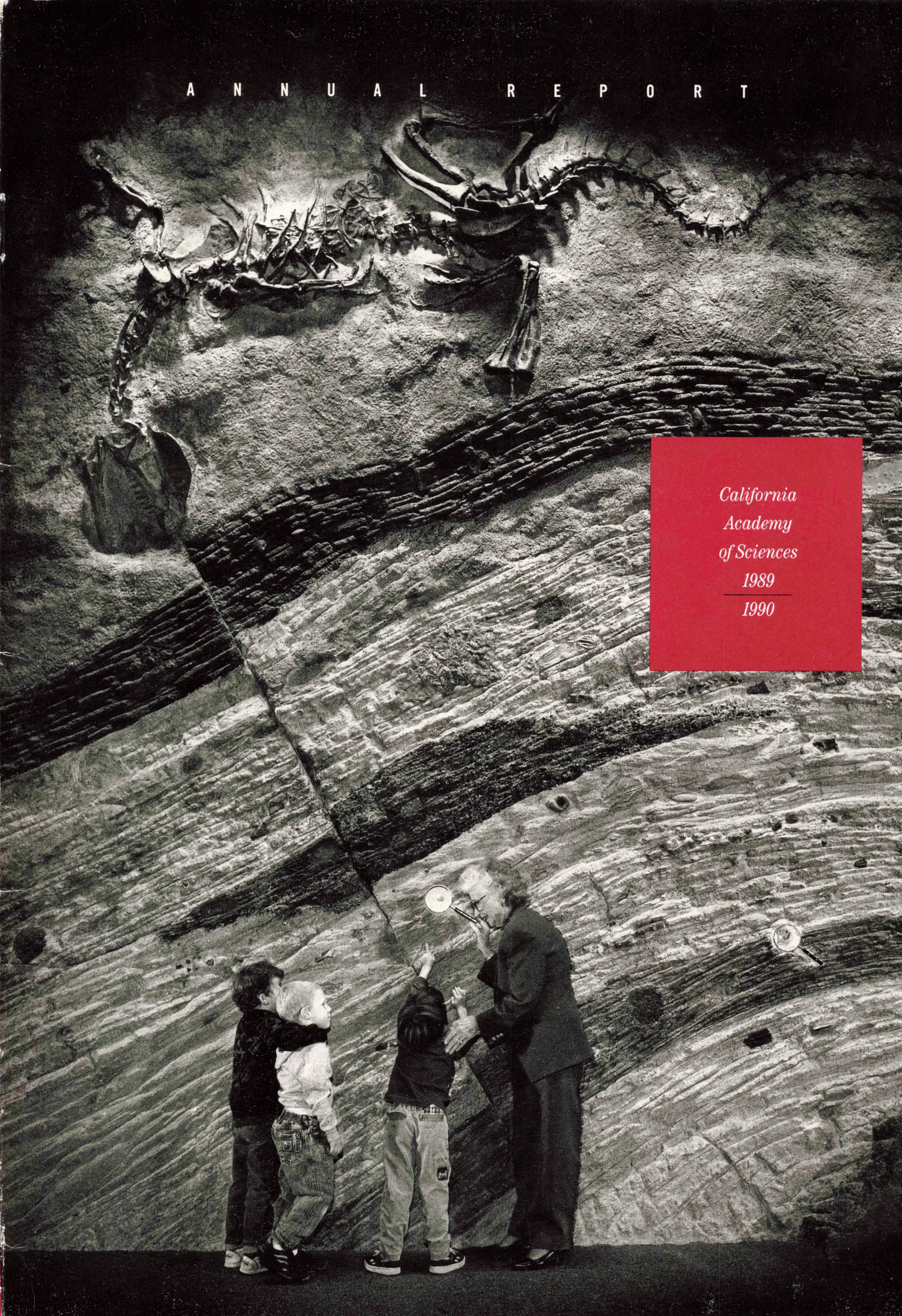
ANNUAL REPORT

California Academy of Sciences

1989

1990



CALIFORNIA ACADEMY OF SCIENCES

STEINHART
AQUARIUM

FROM THE CHAIRMAN OF THE BOARD OF TRUSTEES

The Annual Report provides an opportunity to reflect on the past and discuss the future.

The Loma Prieta earthquake closed the Academy for seven days for inspection—the first time the Academy has been closed in over ten years. The Academy was certified by city engineers as safe for the public before reopening.

Very little damage was sustained by the Academy: a few cracks, some collapsed shelves in the library, but relatively little damage. Our own investigation of the Academy's structures indicated that we should brace the supporting beams in the entrance. We have combined this with the planned enclosure of the portico. We expect the work to be completed in the spring of 1991.

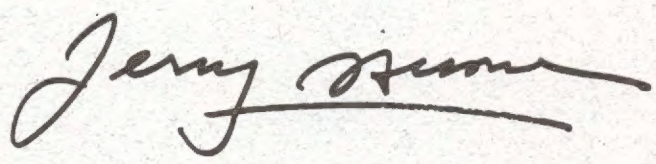
The project has given us an opportunity to rethink the visitor experience at the Academy. We want the entrance to expose visitors to the Academy's exhibits, our educational programs, and the scientific research which lies behind so much of what we do.

Last year a trustee committee reviewed the Academy's education programs and determined that we should increase our role in teaching school children and teachers about natural science.

A major new hall, Life Through Time: The Evidence for Evolution, opened in June. The exhibit's use of computers typifies the use of technology to interest and educate the public. Technology will play an increasingly important role in the Academy's exhibit design in the future.

The trustees and staff are beginning to focus their vision of what kind of an Academy will best serve the public and its scientists in the nineties. We have a wonderful institution which helps more than a million and a half people to understand natural science better each year. We also have an old institution. The Aquarium was built in 1923 and underwent a major restoration in 1963. Soon it will need a major overhaul. The modernization of the Aquarium will be the cornerstone of our capital improvement project over the next several years.

We are fortunate to have a talented, energetic, and increasingly focused staff at the Academy. Roy Eisenhardt, the new Executive Director, brings personnel, organizational, and marketing skills that will benefit the Academy greatly in the years ahead.



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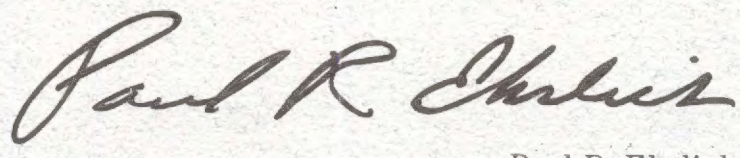
We are living in a time of unprecedented change. The human population will grow by roughly 95 million people this year—the equivalent in numbers of the combined populations of Great Britain, Ireland, Iceland, Belgium, Denmark, Norway, Sweden, and Finland. At the same time, and closely related to the growth of the human population, the number of species of other organisms on Earth will undoubtedly *shrink* by an unprecedented number. This is clear because in the last decade the destruction of tropical forests has accelerated from roughly 1 percent per year to roughly 1.8 percent per year, and tropical forests store half or more of all organic diversity.

Equally alarming, there is growing evidence of greenhouse warming, and a growing suspicion among scientists that recent unusual weather trends (possibly including the California drought) may be connected to the increased flow of greenhouse gases into the atmosphere because of human activities.

The basic problem is that the scale of human activities—human numbers multiplied by the average per capita impact on the environment—has simply become much too large. Civilization is spending its capital, its precious one-time inheritance of deep, rich agricultural soils, fossil groundwater, and biodiversity, in an attempt to support 5.3 billion people. We are squandering our inheritance and calling it "growth."

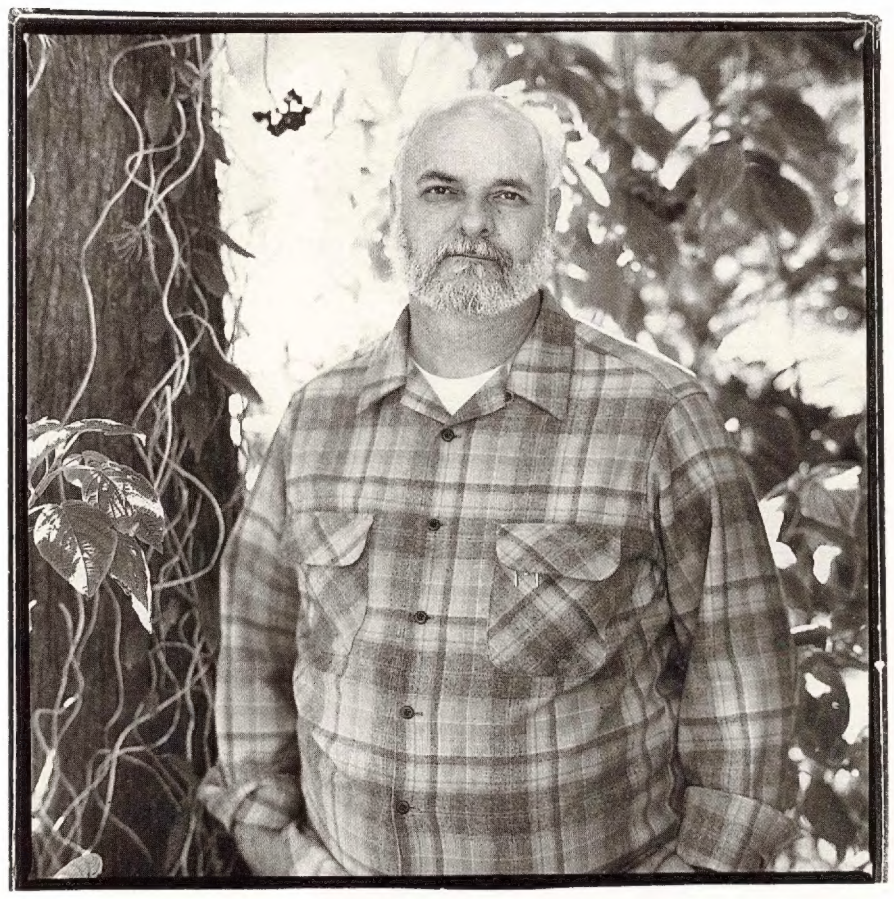
Scientists involved in studying the global environmental predicament generally agree that humanity has at most ten years to undergo a revolutionary change in attitudes and behavior and to start reducing the impact of the human enterprise on Earth's life-support systems. That such a change can occur when the time is right is suggested by the unanticipated events in Eastern Europe over the last year or so. The political face of the world has been dramatically altered for the first time in almost half a century, at a rate that no one believed possible. It seems equally possible that humanity's confrontation with the environment could be ended almost as rapidly as the East-West confrontation. Indeed, the removal of East-West tensions now opens the door to global cooperation on finding ways to create sustainable societies in both rich and poor nations.

And that's where institutions like the California Academy of Sciences can play a major role. The Academy, through its exhibits, other educational activities, and research programs, helps to bring people face to face with their place in the ecological and evolutionary scheme of things. The Academy is the premier institution in the Bay Area for informing people on the nature of biodiversity and on the enormous value and interest that other organisms have for human beings. It is probably not exaggerating to say that if every human being on the planet understood the importance of preserving the other life forms with which we share Earth, the entire human predicament would be solved.



Paul R. Ehrlich

Understanding prompts respect. This basic conviction underlies all that we do at the California Academy of Sciences. From the exhibits we build, to the research we conduct, courses we teach, magazines and books we publish, lectures we sponsor, symposia we host, and expeditions we lead, our aim is to shed light on the wonders and values of the natural world.



Dr. Dennis Breedlove, Curator of Botany, in front of a Deppea splendens *plant. The orange flowered shrub, thought to be extinct in its native Mexican cloud forest, is part of the three-and-a-half-acre New World Cloud Forest in Strybing Arboretum. This section of the Arboretum contains many endangered, threatened, and even extinct (in the wild) plants from the cloud forests of Chiapas, an area of Mexico Dr. Breedlove has studied since 1964.*

Through the Academy's 137 years of operation, our researchers have studied what exists and has existed, as well as how the planet and its inhabitants have evolved and continue to change. Our research takes place both on living material in the field and in the museum, using a collection of 14 million mineral, plant, and animal specimens as well as anthropological objects. This work has always been challenging. It has often been exciting as well. Today, the environmental crisis threatening the natural world makes it crucial. The kind of understanding we pursue, and the regard that stems from it, represent our greatest hope for the future.

Both at home and in such places as Uganda, Madagascar, China, Vietnam, and Costa Rica, Academy researchers are directly involved in efforts to stop environmental degradation. They do this by focusing on endangered areas, helping local scientists with their own habitat evaluation and conservation work, and alerting the public to the effects of habitat loss.

Curator of Botany Dr. Dennis Breedlove's work in Chiapas, Mexico, has helped bring attention to the importance of the disappearing tropical forests in southern Mexico. His 25 years of work there have increased the likelihood that the government will establish a preserve with the potential of saving thousands of endemic species from extinction.

As the forests disappear, so do the traditional cultures that depend

on them. In *The Flowering of Man*, Dr. Breedlove and Dr. Robert M. Laughlin describe a surviving group of Mayan agriculturalists and their relationships to the plants in the tropical forests. It includes the Mayan's taxonomic organization of nearly 15,000 different plants, enumerating their uses and locations.

Knowledge leads to appreciation. Appreciation breeds concern and responsible action.

Since 1987, the Academy's Osher Laboratory for Molecular Systematics has significantly broadened the scope of our research. By looking at the genes and proteins of organisms, scientists gain new tools which help them decipher evolutionary relationships.

These tools have urgent practical uses beyond systematics. In trying to determine if captive Asian elephants could successfully breed with a separate subspecies from Sri Lanka, for instance, Research Scientist Dr. Robin Lawson compared proteins in 90 blood samples of individual elephants from 40 zoos. Since he found no difference between the two populations, zookeepers could breed them and hence improve the

The Academy is undertaking a major inventory of Costa Rica's Amistad Biosphere Reserve, one of Central America's last biological frontiers. The project, a collaboration with Stanford University's Center for Conservation Biology, will monitor the health of the Amistad system and measure the effects of global climate change on the habitats within it.

La Amistad, designated a biosphere reserve in 1982, is a model of conservation and research in an area where nature is under siege by population growth and habitat destruction. The reserve covers nearly two million acres of little-researched lowland rainforest, alpine meadow scrub, and montane cloud forest, habitats to such animals as quetzals, jaguars, and tapirs. La Amistad is also home to the Bribri and Cabecar Indians who have lived there for at least 4,000 years.

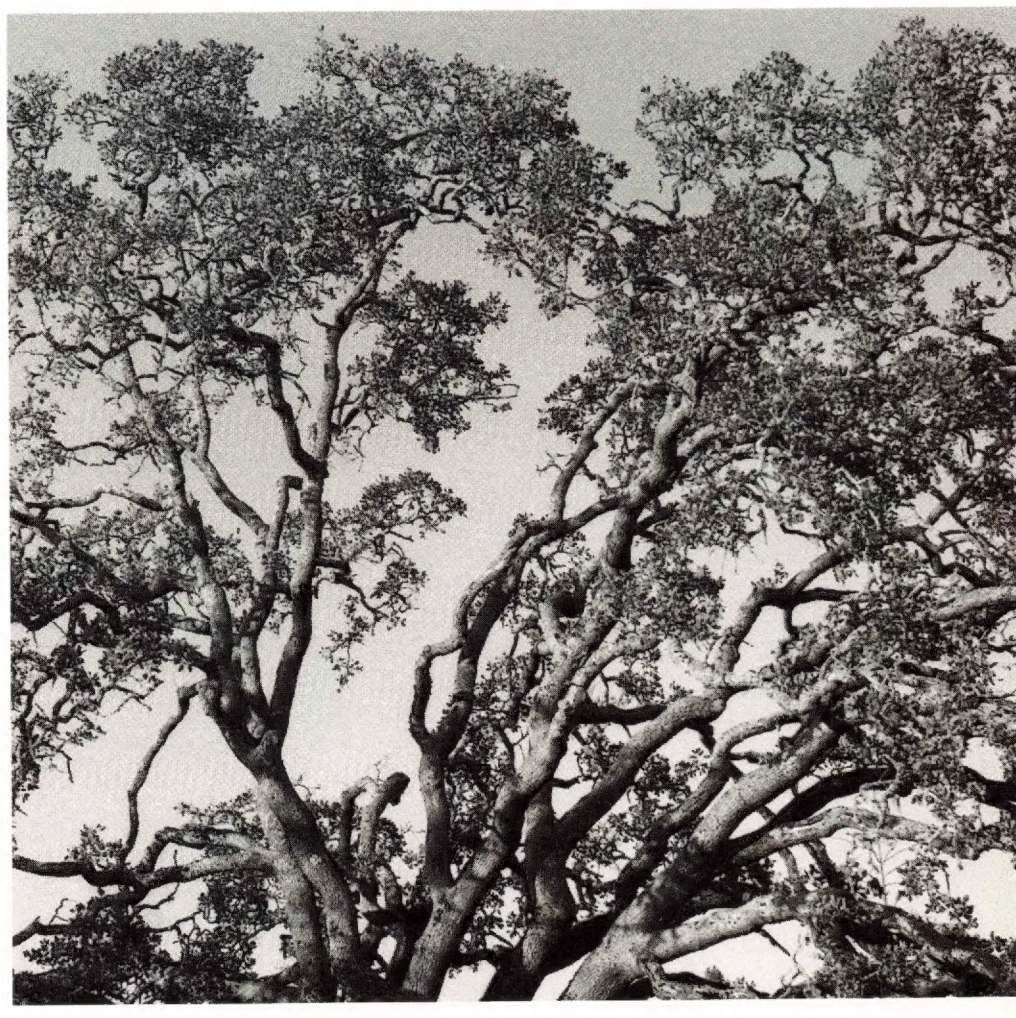
The participants will work closely with the Costa Rican Biosphere Coordinating Commission and will encourage Costa Rican scientists to use research facilities at Stanford and the Academy.

The project, coordinated by Academy botanist Dr. Frank Almeda and Stanford's Dr. George Gorman, will base its research out of two facilities, one at Hitoy Cerere on the Caribbean and another just outside the park's boundaries at Las Alturas on the Pacific.

genetic diversity of the captive Asian elephant population.

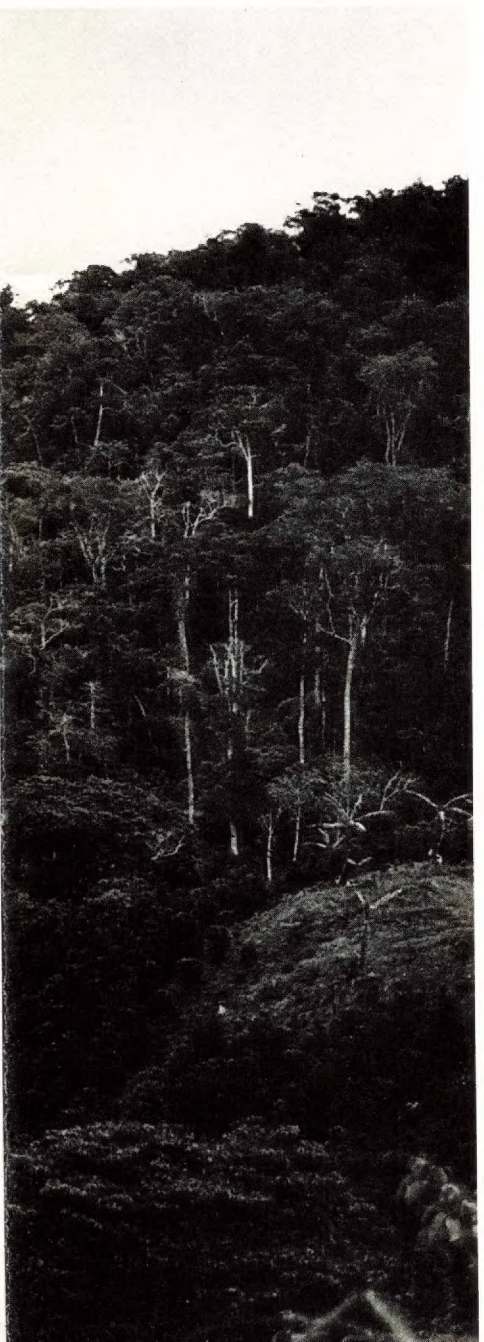
The Academy has collected and cataloged organisms for nearly a century and a half. But this research is now pivotal in our efforts to preserve and restore the health of habitats. To protect the biological diversity of an area, we must know what forms of life it includes, and by exploring and recording this diversity, Academy scientists establish the baseline against which environmental change is measured.

As we learn more about the variety of species, we realize the enormity of this task. Some entomologists estimate that the one million insect species described to date may represent as few as three percent of the existing insect species on Earth.



This oak tree is flourishing in the 3,100-acre Pepperwood Ranch Natural Preserve, which encompasses many diverse habitats. In addition to its conservation role, the preserve serves as a natural laboratory for outdoor education and research.

Though much work remains to be done, Academy scientists are making tremendous progress. This year, Senior Curator of Ichthyology, Dr. William Eschmeyer, completed the *Catalog of the Genera of Recent Fishes*. This milestone work describes every genus named between 1758 and 1989, over 10,000 genera, from *Abalistes* to *Zyphothyca*. Dr. Eschmeyer has now begun work on a data base describing all 60,000 named species of recent fishes. Both the generic and specific versions of the catalog will be accessible by computer.



To increase access to research collections, the Academy staff continues to computerize collection data and coordinate with other museums and universities around the country. Soon it will be possible to enter geographical coordinates into a computer and, in moments, receive a list of all the known species found there—a task that now could take months of research, if it could be done at all. This data will speed up basic biological research and help scientists establish conservation priorities.

In addition to collecting and classifying organisms, Academy researchers participate in studies of anthropology and archaeology, animal behavior, population ecology, biogeography, and evolution. Our scientists teach at local universities, conduct adult education courses at the Academy, provide expert advice on biological and technical matters to legislators and policy makers, and publish papers—124 this year.

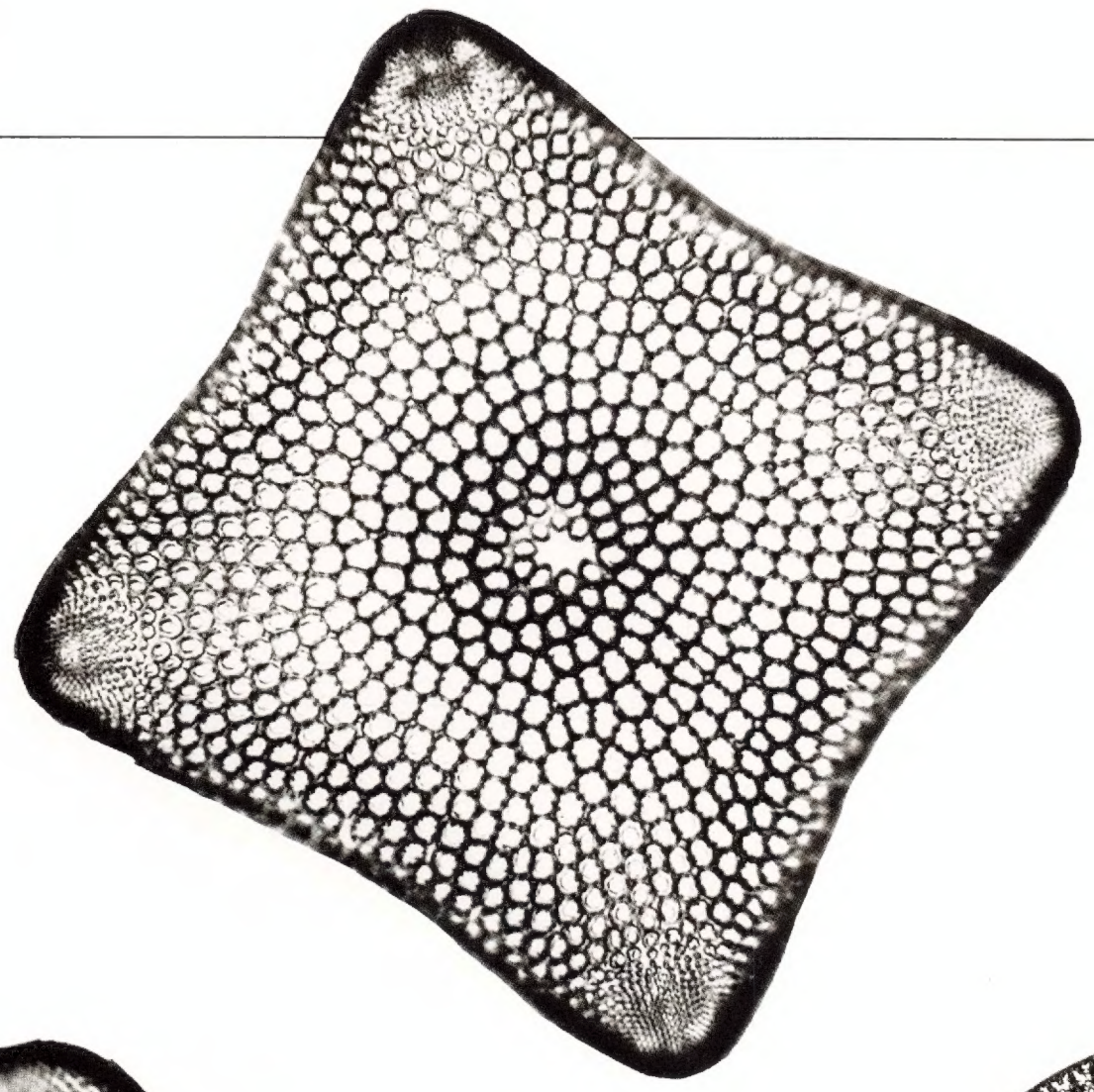
Scientists and the public meet at the Academy to investigate and discuss the important issues of our age. The Honorable Philip E. Leakey (second from right) lectured on the difficulties of balancing economic development and wildlife conservation in Kenya. To Mr. Leakey's left is Academy donor Gordon Getty.

On a more theoretical level, Academy researchers stretch and test the fundamental principles of systematics, both in their publications and at weekly meetings where they read papers, brainstorm, and debate such issues as the functional definition of species—a question that presses on our researchers as they work at higher and higher levels of resolution.

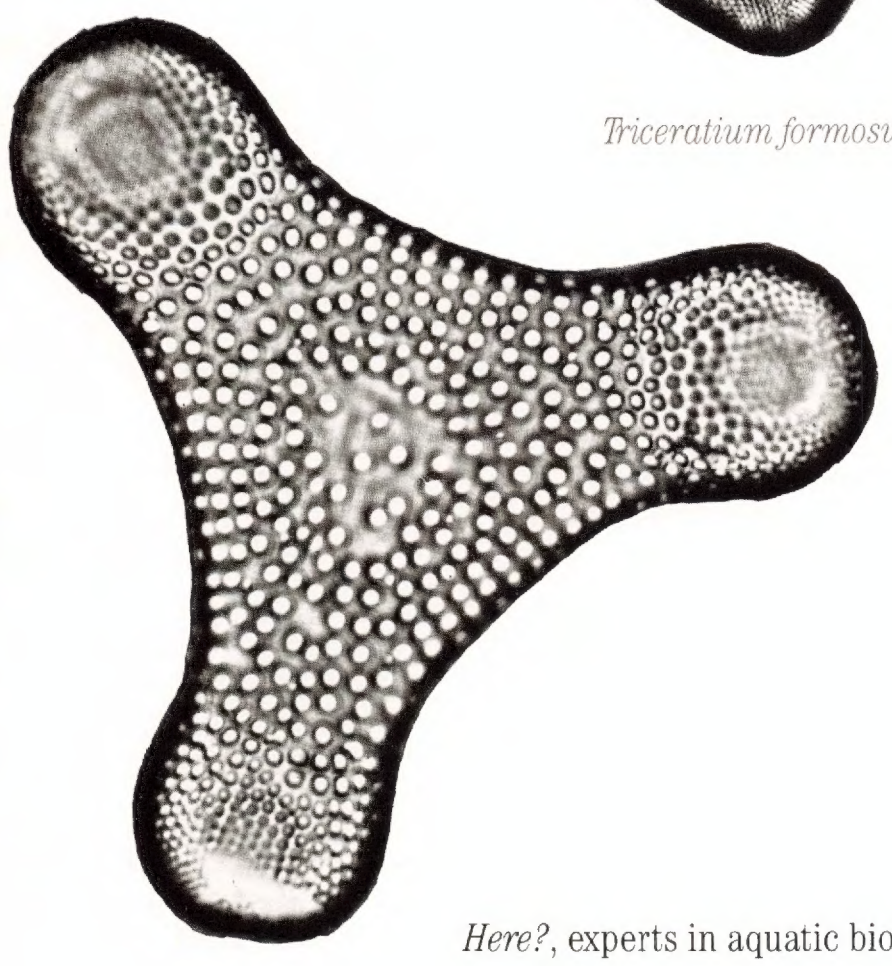
At the Academy, scientists and the public meet to investigate and discuss the issues of our age: questions about environmental health, the preservation of species and cultures, and the role of science education in the public schools. The Academy hosted a number of lectures and panel discussions this year. In a lecture co-sponsored by the L.S.B. Leakey Foundation, the Honorable Philip E. Leakey spoke about balancing economic development and wildlife conservation in Kenya. The Academy and the Golden Gate National Recreational Area hosted a panel discussion on the *Exxon Valdez* oil spill. Titled *Alaska in Recovery: What if it Happened*

GROWTH & USE OF COLLECTIONS IN RESEARCH DEPARTMENTS

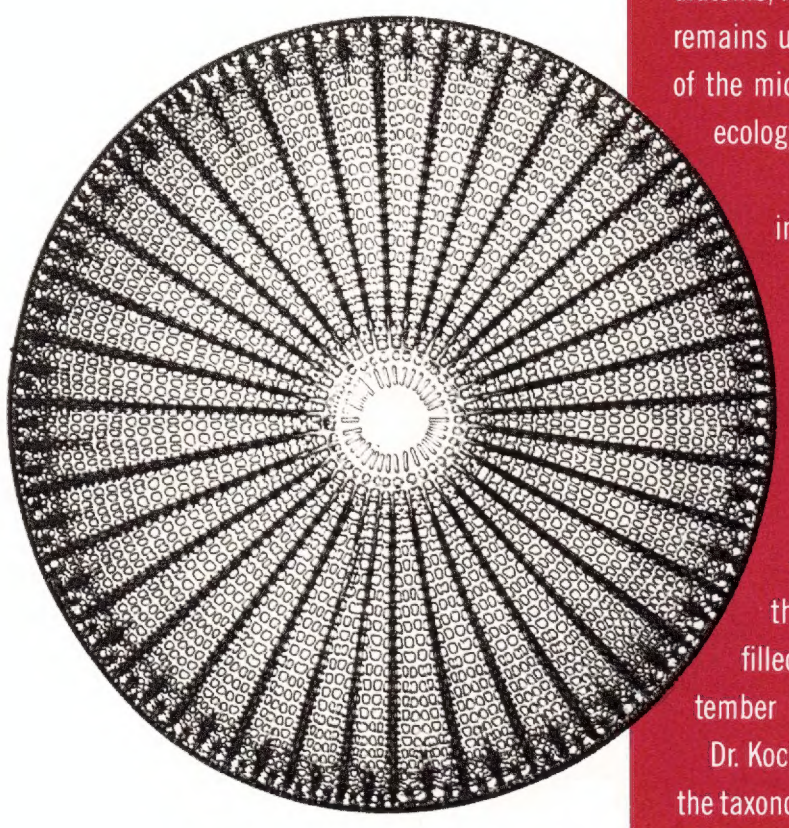
Department	Acquisitions Total specimens accessioned	Loans Total specimens loaned	Research Total visitors (number of visitors days)
Anthropology	219	371	36
Aquatic Biology	N/A	N/A	950
Botany	19,924	8,781	762
Entomology	93,657	31,002	3,078
Herpetology	2,586	1,222	129
Ichthyology	4,516	7,880	179
Invertebrate Zoology and Geology	21,745	11,652	164
Ornithology and Mammalogy	131	484	844
Totals	**142,778**	**61,392**	**6,142**
Total holdings in all collections			**14,233,485**
Percentage of growth since 1972 for all departments			**66.57%**



Triceratium formosum



Triceratium sp.



Arachnoidiscus ehrenbergii

Here?, experts in aquatic biology, public policy, and other related fields discussed what effects an oil spill of the *Valdez's* proportions might have on San Francisco Bay and asked how we would respond if it happened here.

Society will survive only if we can understand the price of ecological disaster. Global warming, ozone depletion, habitat destruction, and the loss of species pose acute threats. The Academy's educational programs play a crucial role in helping to teach adults and children the importance of habitat preservation and a regard for all of life's forms.

Our educational programs begin with the initiation rites of toddlers who come face to face with the diversity of life for the first time at the Academy. We supplement elementary and secondary education, and continue through to high-level symposia on diatoms and systematics.

DIATOMS

Consider the diatom: a tiny, single-celled plant at the bottom of all aquatic food chains; one of the most abundant and diverse organisms on Earth; responsible for creating, through photosynthetic activity, as much as half of the oxygen we breathe. Yet, despite the importance of diatoms, much of the world's diatom flora remains undescribed and the exact role of the microscopic plants in the Earth's ecology remains a mystery.

The Academy has been studying diatoms since 1921 when Dr. G. Dallas Hanna started a collection which has since become the second-largest in the U.S. This year the Academy boosted its commitment to the long-term study of diatoms by creating the Hanna Chair in diatoms, filled for the first time, in September 1989, by Dr. Patrick Kociolek.

Dr. Kociolek's research has focused on the taxonomy, external structure, systematics, and phylogeny of diatoms. Understanding these influential and nearly ubiquitous plants is important in itself—they are a central piece in the puzzle of the Earth's natural history and tell us much about the processes of evolution and about prehistoric climatic conditions. But there are other pressing reasons to study diatoms, says Dr. Kociolek. For instance, they respond quickly and measurably to many different kinds of pollution and are therefore sensitive biological monitors of the health of rivers, lakes, and oceans. Diatoms can also help reveal the location of oil deposits. To date, because so many diatoms are still undescribed, especially in the New World, only a fraction of their potential as conservation and resource location tools has been realized. To take advantage of their potential, much basic research such as Dr. Kociolek's, needs to be conducted. Furthermore, the existing data must be coordinated and computerized so it can be efficiently used.

Jerry Kay brings the Academy's educational message to more than ten million people a week. His radio programs, broadcast on CBS network stations nationwide and on 12 non-affiliated stations in the west, focus on technology and the natural sciences. Kay's two-hour-long *Earthnews* allowed listeners to call and help Kay interview scientists in the forefront of their fields.

"There are no stupid questions in science," says Kay, whose programs usher even the most scientifically naive listeners into the world of scientific exploration, educating them about the crucial scientific choices they face. Kay employs this same philosophy on the museum floor where he regularly hosts the Academy's daily Science in Action presentations.

"My job is to provide the background people need to make sense of what they see in newspapers," says Kay. "There are many initiatives on the ballots these days requiring a level of scientific and environmental sophistication many of us just don't have. And the issues will continue to get more complicated."

Kay strives to ignite appreciation and enthusiasm for science in Bay Area students, who are increasingly turning away from the scientific professions. "In ten years the United States will be short 600,000 scientists," Kay says. "For every ten professorships in science, there will be only eight qualified applicants." In the classroom, on the museum floor, and over the airwaves, Kay celebrates the wonders of science and the natural world so young people will recognize the importance and thrill of the scientific professions.

In May, the Academy, in association with the Institute for Educational Leadership and the New York Academy of Sciences, hosted a national forum concerned with "The Roles for Scientists as Advocates for Structural Reform of Science Education and the Public Schools." The meeting resulted in a document that the National Science Foundation will employ to guide major changes in science education throughout the country.

Each year one thousand species become extinct and an area of tropical forest the size of Great Britain is destroyed.

Science in Action brings living science and scientists directly to the museum visitors. Each afternoon an Academy staff member is on the museum floor explaining some aspect of our work. Visitors may find herpetologist Jens Vindum showing off his latest snake finds, Dr. John McCosker discussing the predatory behavior of the great white shark, or Karen Anderson introducing one of the Academy's penguins to a crowd of awe-struck youngsters.

Classes offered by the Academy draw thousands into the worlds of science and nature. The Junior Academy's 2,700 members in 1989–90 took courses on subjects ranging from herpetology to the natural history of Pepperwood Ranch, the Academy's nature preserve in Sonoma County. A scholarship program allows all interested children to participate.

The Adult Education Program recruits its outstanding instructors from the Academy staff and the local scientific community. This year, the program expanded its offerings to 187 courses and study-tours serving 3,500 students. Class topics ranged from botany and ornithology to the curvature of space time, quantum mechanics, and DNA research.

Biology Forum, a series of presentations and seminars for high school science teachers, has kept Bay area educators in the forefront of scientific discovery for the past five years. By informing both teachers

The bald eagle (Haliaeetus leucocephalus) *is on both the State and Federal endangered species lists. It inhabits the forest-surrounded lakes and streams of California's Sierra Nevada and the southern Cascade mountains. California once had thousands, but only 93 breeding pairs have survived hunting, pesticide poisoning, and habitat loss. This photograph is part of Academy photographer Susan Middleton's endangered species project.*

Geyser's panicum (Dichanthelium lanuginosum *var.* thermale) *can endure temperatures as high as 110 Fahrenheit, and flourishes in areas next to mud pots, hot springs, and fumaroles. This endangered plant is also part of Academy photographer Susan Middleton's project.*

© 1990 SUSAN MIDDLETON AND DAVID LITSCHWAGER. THESE PHOTOGRAPHS WERE MADE POSSIBLE BY CONTRIBUTIONS FROM PG&E

Life Through Time is one of the most exciting and ambitious exhibits in today's museum world. Perhaps its most innovative component is LIFEmap, a display which employs the most advanced personal computer technology available to reveal the evolutionary relationships among organisms. The exhibit is accessible enough to compel and educate the scientifically naive, yet complete enough to fascinate the scientifically sophisticated.

LIFEmap is displayed on eight computer monitors, each one representing a different evolutionary category. Visitors work their way through the programs, choosing on-screen options with a pointer, to reveal various evolutionary relationships. For instance, when the monitor devoted to amniotes is engaged, drawings of reptiles flash onto the screen. A voice describes the anatomical features all reptiles share. The voice then asks whether birds or turtles are more closely related to the dinosaur *Deinonychus*. The user who answers "birds" hears that they are living dinosaurs because they share S-shaped necks, upright posture, and other features with their prehistoric ancestors. The user can then follow the life map of an amniote backward or forward to points of evolutionary junction with other creatures.

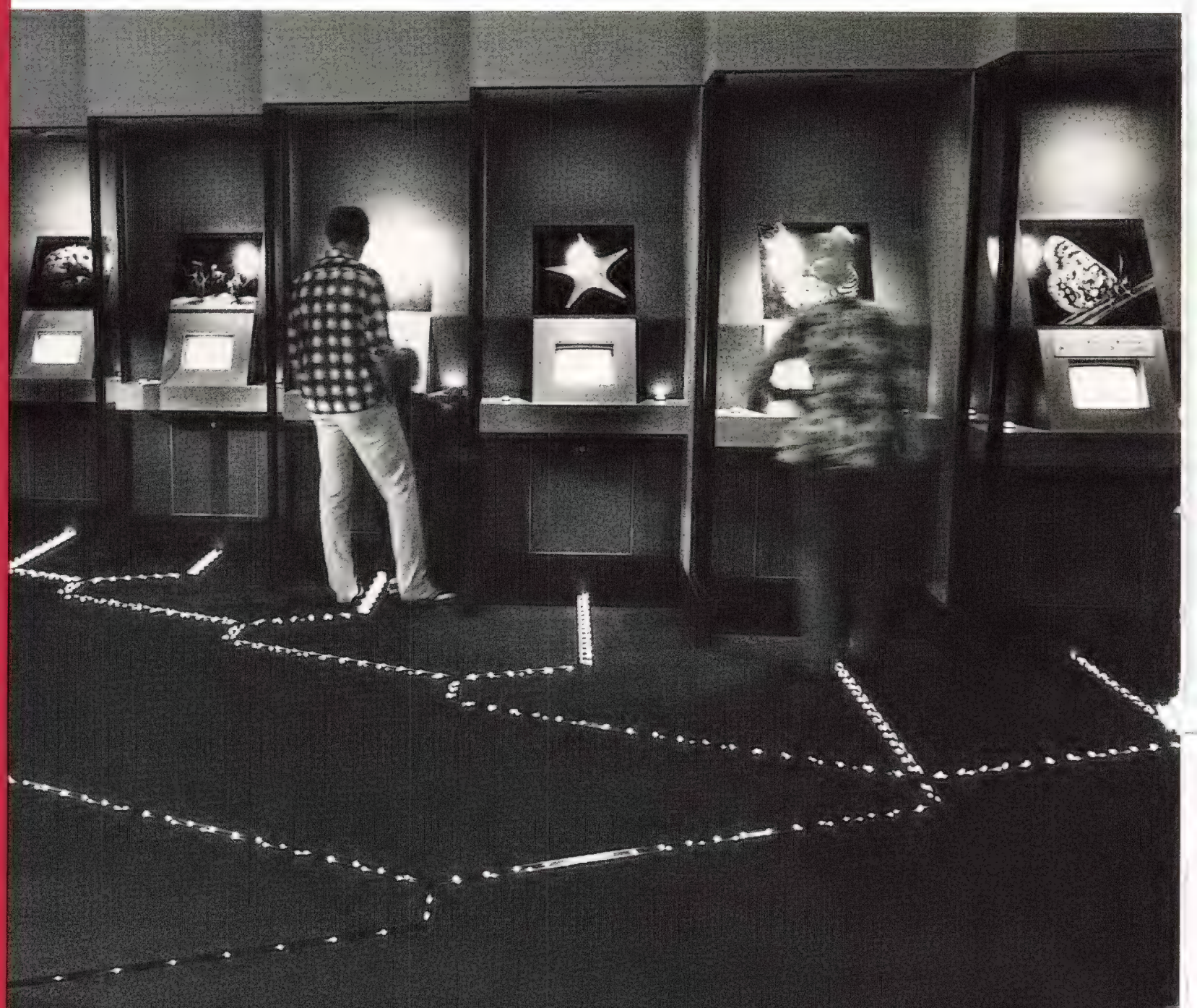
At the foundation of LIFEmap is a body of theory called cladistics, which aims to reveal the evolutionary relationships among groups of organisms and to draw one complete map of life.

Academy researchers gleaned data for LIFEmap from their own work, from scientific journals, and from still unpublished sources. The program contains facts that will probably not appear in textbooks for years. Compiling and coordinating all of this data, much of which is quite obscure, required unprecedented cooperation between exhibit designers and Academy scientists. Discussions about the licensing and distributing of LIFEmap to schools and stores are underway.

and the students they influence, Biology Forum's impact is multiplied. An extension program for rural high school teachers was added this year.

Our docents are our teachers on the museum floor. In preparation for their role as educators, docent trainees attend lectures and training sessions led by Academy scientists. This year 80 trainees graduated, bringing the total number of docents to approximately two hundred. The Academy also relies heavily on the work of more than six hundred other volunteers who contribute time and energy to a wide variety of projects from the Run to the Far Side race through Golden Gate Park to the creation of Life Through Time: The Evidence for Evolution.

Morrison Planetarium shows, such as A Cosmic View and Time Before Life, addressed questions about our origins and our place in the universe. Nearly nine hundred Planetarium shows gave this kind of perspective to about 170,000 people this year. In addition to its regular shows, the Planetarium presented special school shows to more than 40,000 elementary and middle school students.



The Academy's library is another excellent community resource. The Mailliard Library, and the eight departmental libraries, contain more than 170,000 volumes, and hundreds of journals, which focus on natural history, systematics and taxonomy, evolutionary biology and biogeography, and local and regional natural history. Recently acquired computer and laser disk technologies now extend the library's horizons far beyond its own collections.

Librarian Tom Moritz continued to increase public access to the library this year. He and his staff are now preparing to open an Information Resource Center on the main floor of the museum. The center will employ video and compact disk technology and will have phone and computer links to our main library, and to other Bay Area libraries. Visitors will get answers to reference questions, or find nearby sources for further information.

We want to express the power and responsibilities of science, but also to reveal the joy of grasping its basic principles and the wonder of direct contact with the natural world.

The grand opening of Life Through Time: The Evidence for Evolution took center stage in June. The new permanent hall, a journey through three-and-a-half billion years of evolution, is a fusion of design and science. The exhibit features lifelike models of prehistoric ecosystems, fossils, reconstructed skeletons, and modern living relatives of ancient plants and animals. The combination of scientific depth, clarity of presentation, use of new technologies, and pure enjoyment have made it a model for future exhibits, not just within the Academy, but also by some of the world's major museums.

The involvement of Academy scientists in the creation of Life Through Time was unparalleled in Academy history. Much of the information is so new that it has not yet been published in scientific journals. Life Through Time dispels many common notions about the prehistoric world and its relationship to our own. Birds, for instance, are revealed as the modern descendants of dinosaurs, not the lumbering giants that

Steinhart Aquarium is one of the Academy's greatest attractions. By exposing visitors to the beauty of marine life and the breadth of aquatic biodiversity, the aquarium engenders a profound respect and concern for the underwater world.

monopolize most dinosaur exhibits, but agile, warm-blooded creatures.

Walking through the exhibit, visitors see the overwhelming evidence for evolution and the diversity of life forms that have existed over time. The exhibit's signs are designed to provide various levels of information. One may simply read the name of an organism and learn its place in the fossil record, or go on to read new and detailed information about its natural history and its relationship to modern organisms.

Our work as public educators is both serious and entertaining. Nowhere is this more evident than in the Steinhart Aquarium. With over 14,000 fish, ranging in size from the tiny killifishes to the 300 pound giant seabass, the Aquarium is a living museum of biodiversity. As coral reefs are dying and toxic wastes are fouling waterways and oceans, it is more important than ever for us to engender in our visitors an appreciation for the natural wealth at stake.

The Aquarium is also just plain fun; a place to come face to face with dolphins, sharks, penguins, and eels; a place to get your hands wet in the tide pool handling sea stars and hermit crabs; a place to see the flick of a snake's forked tongue, to observe tadpoles transform into frogs,

chameleons changing colors.

Dinofest, an installation of huge mechanized dinosaurs which roared and lurched around their prehistoric environments, was this year's most popular exhibit. Academy attendance records were shattered as children and adults came to see huge replicas of our culture's favorite extinct creatures.

More and more, the Academy is a place where people can seek scientific explanations and interpretations of events in the modern world. Toward this end, the Academy is creating an exhibits team that produces timely displays on short notice. The first of these "quick" exhibits, one on Lyme disease and another on the Loma Prieta earthquake, provided context, depth, and perspective on stories in the news.

When the *Voyager 2* sailed past Neptune in August 1989, the Academy screened live broadcasts of the mission's video images in the Morrison Auditorium. Sky buffs came to the Academy to watch the first close encounter with the giant blue planet and its moons. Others wandered unknowingly into the auditorium from the museum floor, surprised and honored to find themselves witnesses to an important scientific event.

We need to celebrate science, to reveal the value and joy of doing it, so that young people will consider pursuing scientific careers in this culture which increasingly celebrates the collection of wealth above the creation of value.

The Academy moved beyond its walls with a number of traveling exhibits on display in museums throughout the country. Among the Academy's exhibits currently traveling are Under the Canopy, Gorilla!, an investigation of the mountain gorillas of Rwanda, and Sliding Toward Extinction: Vanishing Wildlife of California, Academy photographer Susan Middleton's arresting portrait collection of threatened and endangered California native species.

We look to science to satisfy our craving to understand our place in the universe. The Morrison Planetarium gave 170,000 people an astronomical perspective this year.

The Academy also uses its quarterly science and natural history journal, *Pacific Discovery*, to reach beyond its walls. Responding to the increasing need for responsible information and analysis, *Pacific Discovery* has increased its circulation and widened its coverage of environmental issues. The special Winter 1990 issue, devoted entirely to the California Desert, drew attention to the beauty and value of this fragile habitat and the forces that threaten it. The Sierra Club sent the award-winning issue to all U.S. Senators in an attempt to help them sort their way through the complex and controversial desert legislation before them.

We are living in a time of unprecedented change, much of which is threatening. But there are reasons for hope. This year we have seen signs of a public awakening to environmental crises and a consequent willingness to make changes. Furthermore, the thawing of the Cold War will allow East and West to work together to avert further environmental damage.

At the Academy we are adapting to meet these challenges, not only to ensure our own survival but to help ensure the health of the natural world. To succeed, that adaptation must arise from our commitment to the public's understanding of the world and the deep respect and concern that such understanding brings. □

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Fellows Medalist

Each year, one prominent Fellow is selected for special honors. At the annual Fellows' meeting in October 1990, the institution's highest honor, the Fellows' Medal, was presented to Dr. F. Clark Howell, Professor of Anthropology at the University of California at Berkeley. Dr. Howell is recognized as one of the leading American Scholars in physical anthropology. His research on the Omo Formation in Ethiopia has led to greater understanding of the evolution of primates and other mammals from the Pliocene and Pleistocene in central Africa. Dr. Howell has been an Academy Fellow since 1974, serving the institution in many ways including a term as Academy Vice President.

Distinguished Service Awards

This year, Fellows' Distinguished Service Awards were presented to Dr. Al Leviton, Ms. Carol Prince, and Ms. Dawn Davis. Dr. Leviton, Chairman and Curator of the Department of Herpetology, Chairman of Computer Services, and Executive Director Pacific Division of the American Association for the Advancement of Science, has been responsible for the development and support of the Academy's computer systems.

Ms. Prince, Special Projects Coordinator in the Development Department, has provided leadership and guidance to the staff, and greatly enhanced communication throughout the Academy.

Ms. Davis, Chief Accountant in the Accounting Department, has volunteered many hours to set up a successful in-house recycling program.

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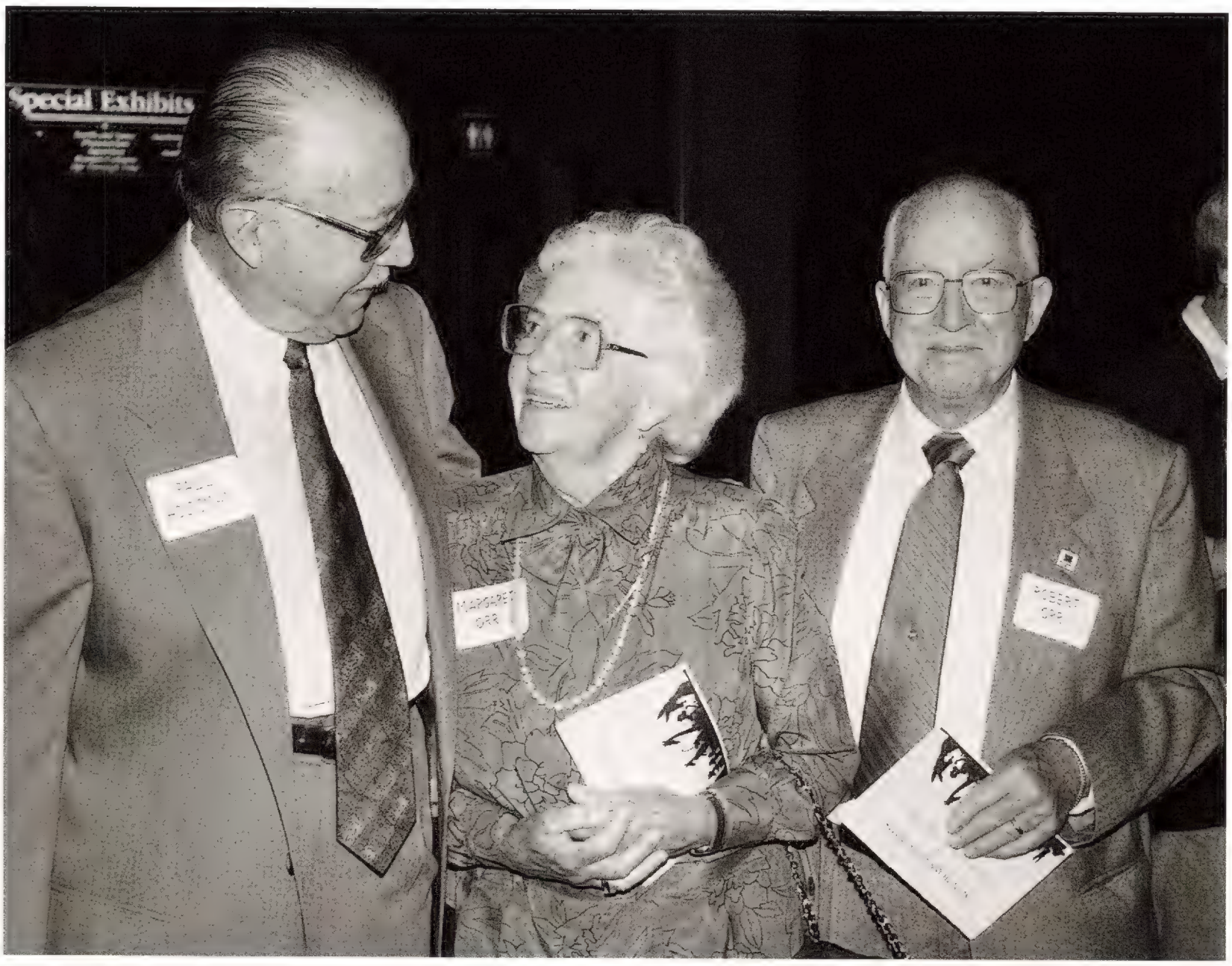

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Greg de Nevers, Pepperwood's resident botanist, explains the dispersal mechanism of a Russula *to an adult education class at the preserve. The Academy's education courses include many field investigations of California ecosystems.*

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OSHER LABORATORY FOR MOLECULAR SYSTEMATICS

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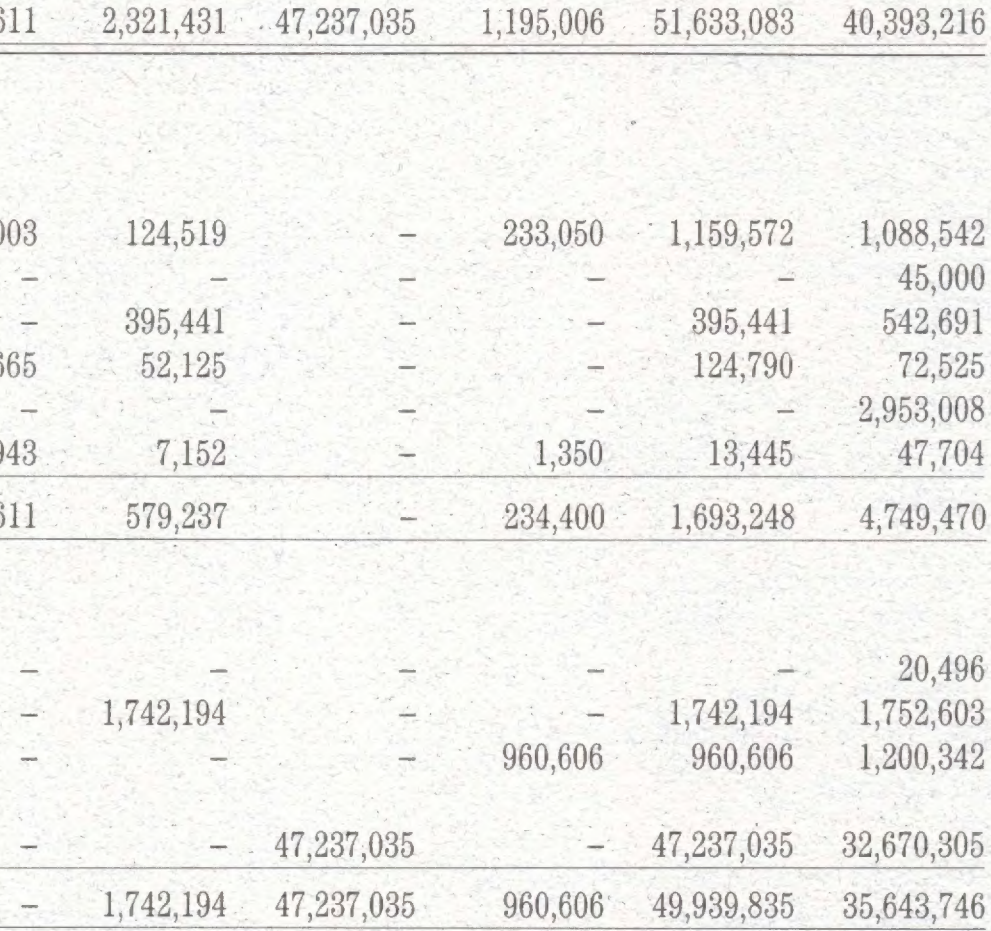
June 30, 1990
(with comparative totals for 1989)

	Current funds			Museum	Total all funds	
ASSETS	General Operating	Restricted	Endowment Funds	Modernization Funds	1990	1989
Cash and cash equivalents:						
Commercial accounts	$137,423	76,222	–	52,072	265,717	490,399
Savings accounts and money market funds	–	1,950,528	–	767,846	2,718,374	5,672,455
Receivables:						
Research grants	–	443,356	–	–	443,356	549,042
Accrued interest and dividends	148,862	–	–	–	148,862	191,283
Other	215,181	25,481	148,801	50,000	439,463	545,775
Inventory	288,842	–	–	–	288,842	267,111
Prepaid expenses	374,803	16,126	–	5,160	396,089	352,080
Investments in marketable securities	–	–	45,473,920	–	45,473,920	30,258,527
Real property	–	–	1,458,460	–	1,458,460	2,066,544
Due from (to) other funds	(285,500)	(190,282)	155,854	319,928	–	–
Total assets	$879,611	2,321,431	47,237,035	1,195,006	51,633,083	40,393,216
LIABILITIES AND FUND BALANCES						
Liabilities:						
Accounts payable and accrued expenses	802,003	124,519	–	233,050	1,159,572	1,088,542
Note payable	–	–	–	–	–	45,000
Deferred grant revenue	–	395,441	–	–	395,441	542,691
Deferred income	72,665	52,125	–	–	124,790	72,525
Deferred restricted support	–	–	–	–	–	2,953,008
Other liabilities	4,943	7,152	–	1,350	13,445	47,704
Total liabilities	879,611	579,237	–	234,400	1,693,248	4,749,470
Fund balances:						
Current restricted:						
Research grants	–	–	–	–	–	20,496
Special projects	–	1,742,194	–	–	1,742,194	1,752,603
Museum modernization	–	–	–	960,606	960,606	1,200,342
Endowment funds, substantially under Board discretion	–	–	47,237,035	–	47,237,035	32,670,305
	–	1,742,194	47,237,035	960,606	49,939,835	35,643,746
Commitments and contingencies						
Total liabilities and fund balances	$879,611	2,321,431	47,237,035	1,195,006	51,633,083	40,393,216

Three Year Attendance at the California Academy of Sciences

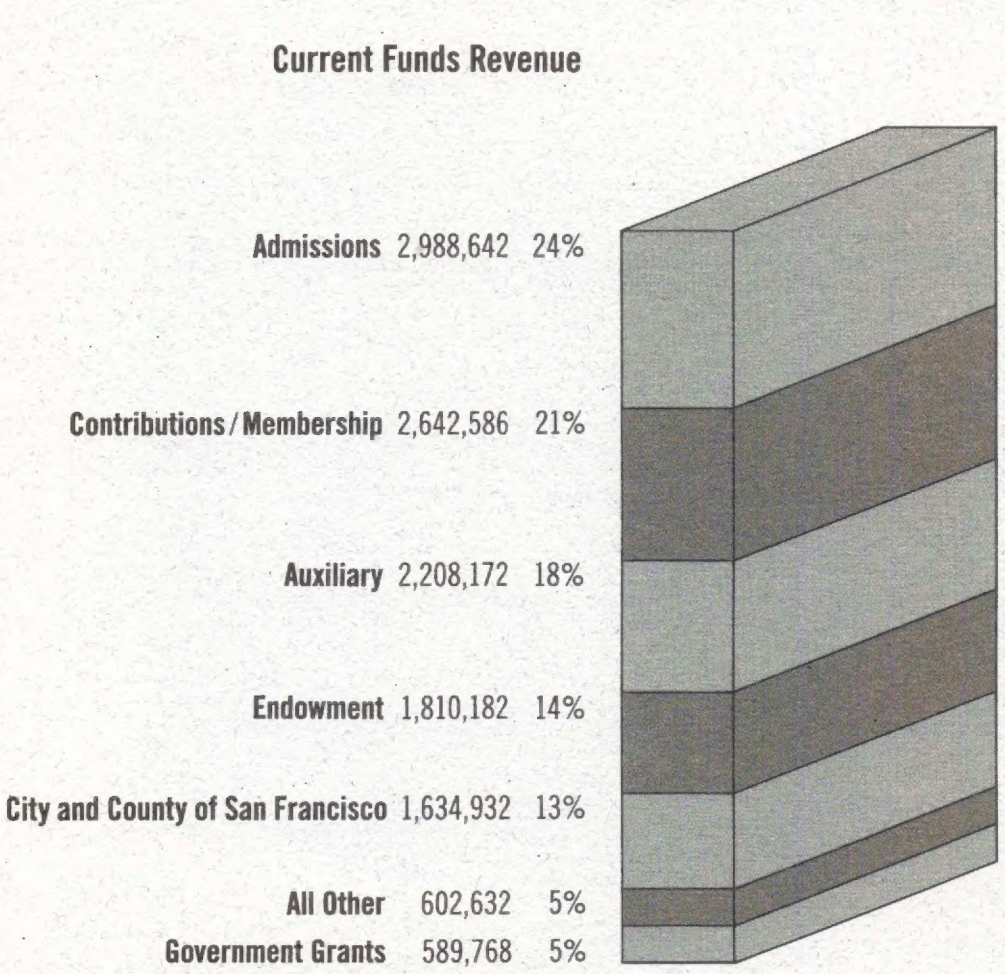


The information on these pages has been summarized from audited financial statements, copies of which are available upon request from the office of the executive director.

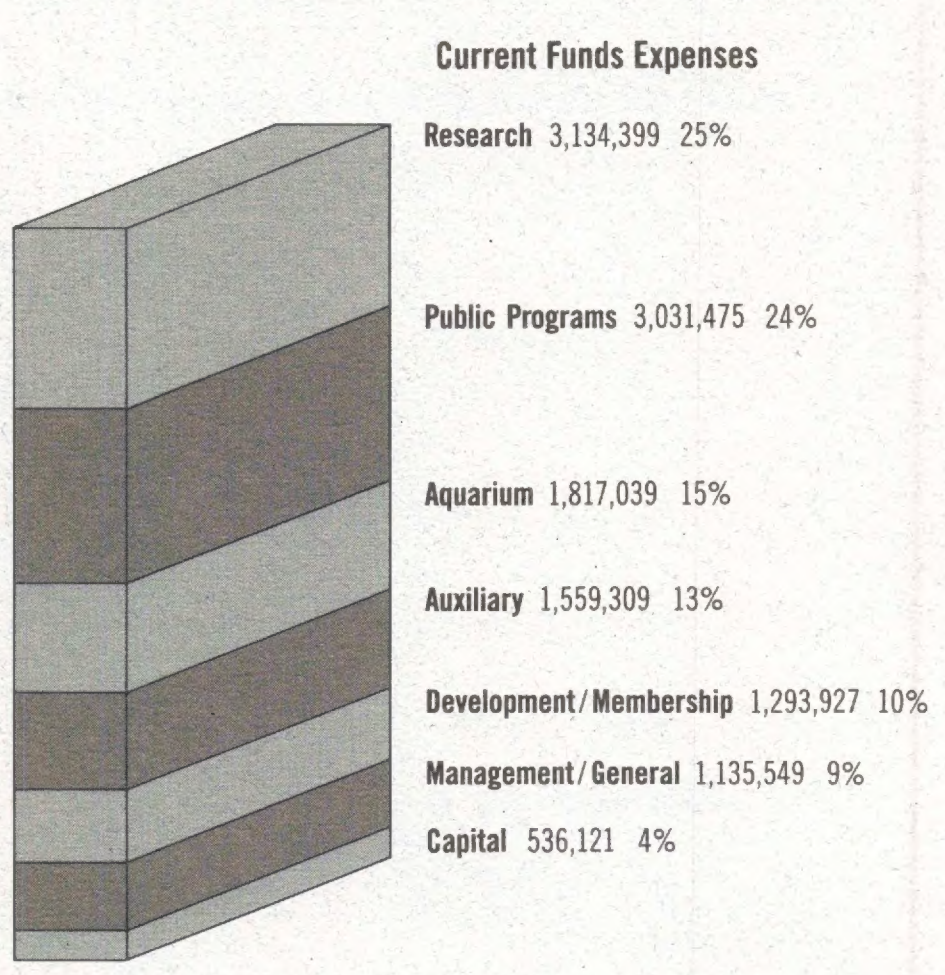
Year Ended June 30, 1990
(with comparative totals for 1989)

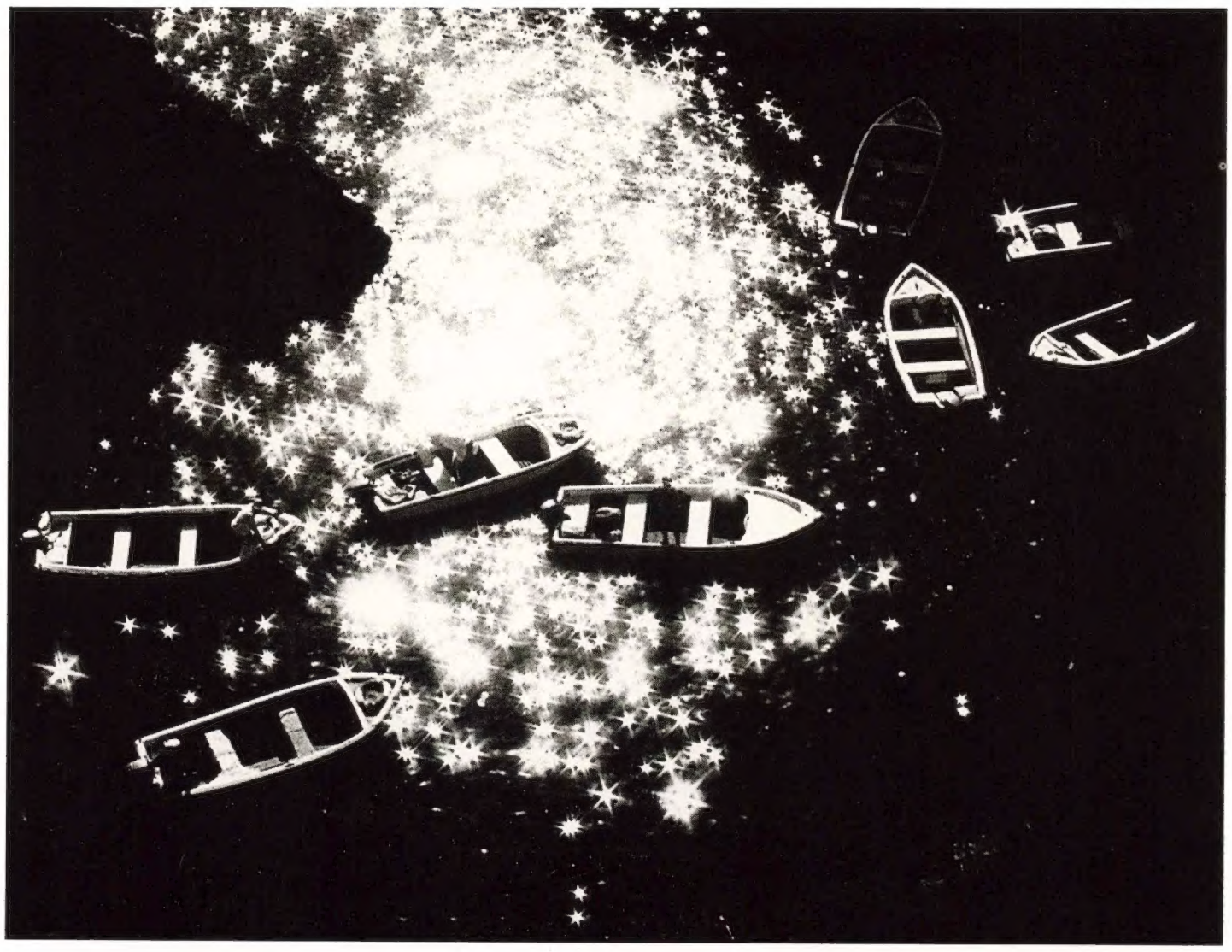
	Current funds		Endowment Funds	Museum Modernization Funds	Total all funds	
	General Operation	Restricted			1990	1989
Support and revenue:						
Admissions	$ 2,988,642	–	–	–	2,988,642	3,124,696
Contributions	1,452,273	610,864	–	–	2,063,137	2,229,517
Memberships	578,773	676	–	–	579,449	567,196
Tuition and program fees	337,755	161,338	–	–	499,093	481,989
Auxiliary activities	2,208,172	–	–	–	2,208,172	2,149,311
Government grant income	42,948	546,820	–	–	589,768	797,748
City of San Francisco	1,634,932	–	–	–	1,634,932	1,559,810
Investment income	1,678,419	326,615	–	–	2,005,034	1,548,357
Rental income, net	103,539	–	–	–	103,539	483,217
Total support and revenue	11,025,453	1,646,313	–	–	12,671,766	12,941,841
Expenses:						
Research	2,582,563	551,836	–	–	3,134,399	3,102,600
Public programs	2,594,990	436,485	–	15,710	3,047,185	3,103,555
Aquarium	1,786,387	30,652	–	–	1,817,039	1,796,939
Development and membership	1,234,807	59,120	–	–	1,293,927	1,177,969
Auxiliary activities	1,559,309	–	–	–	1,559,309	1,609,243
Management and general	1,125,239	10,310	–	23,887	1,159,436	1,198,821
Government grant overhead cost reimbursement	(78,215)	78,215	–	–	–	–
Total operating expense	10,805,080	1,166,618	–	39,597	12,011,295	11,989,127
Capital expenditures	314,540	221,581	–	3,094,127	3,630,248	4,074,917
Total expenses	11,119,620	1,388,199	–	3,133,724	15,641,543	16,064,044
Excess (deficiency) of revenues over expenses before capital transactions	(94,167)	258,114	–	(3,133,724)	(2,969,777)	(3,122,203)
Capital transactions:						
Interest	–	–	–	286,879	286,879	502,285
Net gain on sale of investments	–	–	1,641,017	–	1,641,017	573,090
Net gain on sale of commercial building	–	–	11,128,755	–	11,128,755	1,700,000
Grants and donations	–	–	202,106	1,054,101	1,256,207	4,907,355
Capital campaign transfer	–	–	1,400,000	(1,400,000)	–	–
Recognition of deferred restricted support	–	–	–	2,953,008	2,953,008	3,370,801
Total capital transactions	–	–	14,371,878	2,893,988	17,265,866	11,053,531
Fund transfers	94,167	(289,019)	194,852	–	–	–
Excess (deficiency) of revenues over expenses	–	(30,905)	14,566,730	(239,736)	14,296,089	7,931,328
Fund balance, beginning of year	–	1,773,099	32,670,305	1,200,342	35,643,746	27,712,418
Fund balance, end of year	$ –	1,742,194	47,237,035	960,606	49,939,835	35,643,746

Current Funds Revenue


Admissions 2,988,642 24%
Contributions / Membership 2,642,586 21%
Auxiliary 2,208,172 18%
Endowment 1,810,182 14%
City and County of San Francisco 1,634,932 13%
All Other 602,632 5%
Government Grants 589,768 5%

Current Funds Expenses





Jason Ekedahl, 18, won the grand prize in the Academy's contest for photographers 18 years old and under. More than 1,700 youngsters entered the contest.

California Academy of Sciences

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Project Director: Robert Glavin

Project Coordinator: Gwen Sobolewski

Project Advisor: Keith Howell

Writer: Gordy Slack

Art Direction / Design: Susan Schneider

Photography: Susan Middleton, except:

Frank Almeda, page 4

Jan Lundberg, page 6

G. Dallas Hanna, page 7

M. Murayama, page 7 (Arachnoidiscus ehrenbergii)

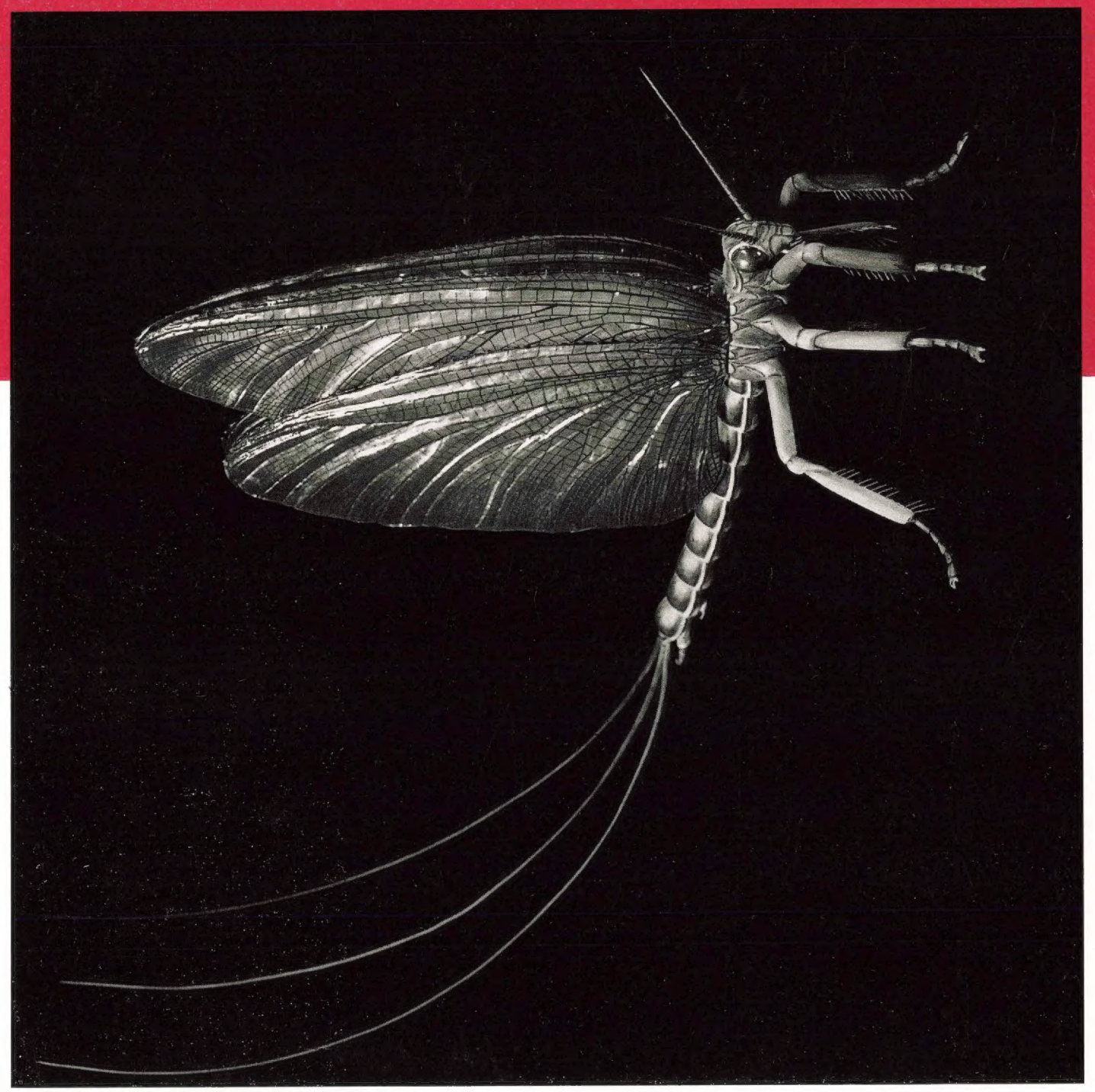
Caroline Kopp, page 10

Typesetting: Mackenzie-Harris Corp.

Color Separations: Wy'east Color, Inc.

Printing: James H. Barry Company

Below: Three hundred and fifty million years ago, eight-inch-long mayflies inhabited the world's coal forests. The insect here is photographed outside its habitat. The life-size mechanized model now twitches in Life Through Time's coal forest exhibit.



Front cover: The story of the evolution of modern life forms will be the greatest epic ever told. Life Through Time: The Evidence for Evolution, the Academy's major new permanent exhibit hall, tells a good part of that story for the first time. Layers of information characterize the exhibit so visitors can peruse evolution's basic outline or read details from each chapter.

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